DOCUMENT RESUME

ED 197 967 SE 034 045

AUTHOR Foa, Joseph V.
TITLE Development of an Interdisciplinary Workshop in Urban Transportation. Final Substantive Report.
INSTITUTION George Washington Univ., Washington, D.C. School of Engineering and Applied Sciences.
SPONS AGENCY National Science Foundation, Washington, D.C.
PUB DATE Mar 76
GRANT NSF-SED72-07726
NOTE 31p.: Not available in hard copy due to marginal legibility of original document. Page A-10 missing from document prior to its being shipped to EDRS for filming.

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Curriculum Development: Engineering: *Engineering Education: Higher Education: *Interdisciplinary Approach: Regional Planning: Science Education: Traffic Circulation: *Transportation: *Urban Planning: *Workshops

ABSTRACT

This project has developed an interdisciplinary graduate workshop in transportation engineering to acquaint students with problems of urban transportation and the role of various disciplines in dealing with these problems. It provides an opportunity for students from the fields of engineering, urban and regional planning, and economics to interact with a multidisciplinary guidance staff drawn from the University, and with representatives of the U.S. Department of Transportation, local government agencies, and consulting firms. Planning for each workshop includes the selection of an urban area for study. Each student must select an aspect of the problem within his field of competence, to study it in depth, and to participate in weekly conferences in the capacity of a specialist in his subject area. Students are required to prepare research papers, and those considered to be most worthy of attention are collected in a volume and disseminated to agencies and organizations considered in the study, as well as to the National Technical Information Service. An evaluation of the project focuses on problems encountered in implementing this type of program and on improvements which have been made. A list of recommendations is included. (Author/JN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Archives of
Division of Science Education
Development and Research
ASE/SCIP/OIDS/NOD/MAT
Property of
THE NATIONAL SCIENCE FOUNDATION

SED-7[illegible]-07726 (EN)
10/18/77
SE

THE
GEORGE
WASHINGTON
UNIVERSITY

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Patricia Babb
of the NSF
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

STUDENTS FACULTY STUDY R
ESEARCH DEVELOPMENT FUT
URE CAREER CREATIVITY CO
MMUNITY LEADERSHIP TECH
NOLOGY FRONTIE[illegible]SIGN
ENGINEERING APP[illegible]ENC
GEORGE WASHIN[illegible]NIV

SCHOOL OF ENGINEERING
AND APPLIED SCIENCE

ED197967

SE 034 045

National Science Foundation
Grant HES-72-07726 A01

DEVELOPMENT OF AN INTERDISCIPLINARY WORKSHOP IN URBAN TRANSPORTATION

FINAL SUBSTANTIVE REPORT

Submitted by Joseph V. Foa
Professor of Engineering and Applied Science
The George Washington University

To

Dr. Alice P. Withrow
Program Manager
Materials and Instruction Development Division, HES
National Science Foundation
Washington, D. C. 20550

March 1976

JAN 19 1981

NATIONAL SCIENCE FOUNDATION

GRANT HES-72-07726 A01 (formerly GZ-2605)

DEVELOPMENT OF AN INTERDISCIPLINARY WORKSHOP IN URBAN TRANSPORTATION

FINAL SUBSTANTIVE REPORT

Submitted by Joseph V. Foa
Professor of Engineering and Applied Science
The George Washington University

INTRODUCTION

The objective of this project has been to develop an interdisciplinary two-semester graduate workshop in Transportation Engineering. The purpose of the workshop is to acquaint the student with the complex problems of urban transportation and with the role which each discipline of the transportation field plays in dealing with these problems.

The methodology which has been developed and tested under this grant is one whereby each student is made to apply his special competence to the solution of real-life transportation problems while at the same time being exposed to the concerns of individuals in other disciplines within the transportation field.

THE WORKSHOP

The workshop (now designated ES 251-252) involves the cooperation of a multidisciplinary student body - mostly engineers, urban and regional planners, and economists - and a multidisciplinary guidance staff drawn from the University, the U.S. Department of Transportation, local governmental agencies, and consulting firms. Its mode of operation is as follows:

At the start of the sequence an urban area is selected for study. Information is gathered, through individual research, assigned reading, and seminars or formal presentations by local government officials, on the transportation needs of the selected area, and on the thinking of local planners and decision makers concerning feasible solutions. Local and regional problems and land use objectives are identified, and applicable technologies are evaluated. The workshop then gradually acquires the character of a team project, aimed at the definition of elements of a transportation system that may be designed to serve the land-use and other objectives previously identified.

Each student in the sequence is required to choose a pertinent aspect of the problem within his field of competence, to study it in depth, and to participate in the capacity of a "specialist" in his chosen subject in weekly conferences with the guidance staff and with his fellow students in the course. These conferences consist for the most part of informal seminars for exchanges of information among the participants or for the discussion of conflicting ideas or requirements. Often the format followed is one of presentation-response: each student summarizes the progress of his or her project, elucidating the most interesting or troublesome aspects, and then solicits responses from the other students and staff members. These presentations are supplemented by invited talks by selected lecturers to provide coverage of pertinent subjects not included in the selected areas of "specialization". Continuing contacts are maintained by the individual students and by the class as a whole with the governmental agencies most directly involved in planning and decision-making in the region under study. At the end of the course each

student reviews and discusses in a term paper the ideas which he has developed in his study and offers recommendations in the light of what he has learned about the constraints associated with other aspects of the overall problem. At the end of each project, the papers which are considered most worthy of attention are collected in a volume, copies of which are sent to interested agencies and organizations in the urban region considered in the study, as well as to the National Technical Information Service for further duplication and unlimited distribution.

HISTORY OF THE WORKSHOP

A pilot run of the sequence was started by the GWU School of Engineering and Applied Science in the Spring Semester of 1971, as course ME 251-252 (concluded in the Fall Semester of 1971). The area selected for study in this first project (designated Project A) was Arlington County, Virginia (Ref. 1).

In a second pilot run, which was started in the Fall Semester of 1971 and terminated in the Spring Semester of 1972, the subject for study (designated Project B) was that of access to Dulles Airport. Because of unexpected delays, the volume of collected term papers on Project B (Ref. 2) was not issued until February 1973, seven months after the starting date of NSF Grant GZ-2605.

The third run, designated Project C, was the first one to be supported from the start under this grant. Work on Project C was initiated in the Fall Semester of 1972 and terminated in the Spring Semester of 1973. The subject for study was "Transportation in the Center of Washington, D.C.", the center of Washington

being defined as the "L'Enfant City" area, bounded by the Rock Creek, Florida and Benning Avenues, and the Anacostia and Potomac Rivers.

Thanks to the funds made available by the National Science Foundation under this grant for the support of a multidisciplinary guidance staff, of assistants, and a program of invited lecturers, as well as for the acquisition of background information, the operation of the sequence in Project C turned out to be a distinct improvement over that of the previous "pilot runs".

Discussion sessions and seminars were held for three to four hours each week in both semesters, under the joint guidance of Prof. Carl M. Harris, of the Department of Operations Research, Mr. Edward D. Studholme, of the Department of Urban and Regional Planning, and the writer. Additional guidance was given at various sessions by Dr. Duncan MacKinnon, of the Urban Mass Transportation Administration, U.S. Department of Transportation, who also gave two formal talks. Furthermore, all of the invited speakers volunteered their consulting service to the students throughout the course. Two graduate students, Messrs. David Sobel and Arshad Nawaz, served as part-time assistants. The most significant papers written by students under Project C are collected in Ref. 3.

It is worth noting at this point that the testing of the new services brought to light certain difficulties that had not fully revealed themselves in the pilot runs:

1. Talks by Staff and Guest Lecturers

The intended purposes of these talks were: (1) to provide the project team, in the shortest possible time, with the required background information; (2) to cover

relevant subjects not included in the study areas selected by the students, and (3) to put the students in direct contact with appropriate governmental agencies and consulting firms and with people of recognized competence and practical experience in urban transportation planning or technology. As already mentioned above, all the invited speakers were most helpful in every respect, not only in their presentations but also in the follow-up guidance and advice which they continued to give individual students for the remainder of the course. Yet a difficulty arose from the fact that in the early stages of the project the student audience was not knowledgeable enough to get the most out of the lectures, while in the later stages the project had already progressed too far to permit substantial modifications based on the ideas and information provided by the speakers. Thus, less benefit was derived from the "Invited Speakers" phase of the program than had been hoped for.

2. Topic Selection

Because of their lack of familiarity with the problems of transportation at the start of the project, most of the participants experienced a great deal of uncertainty in their choice of a study area.

3. Drift of Topics

The cross-stimulation of the group discussions appeared to generate a surprising inclination, on the part of most students (or, at least, of most engineering students), to shift their individual researches to subjects outside their respective fields of competence, thereby greatly reducing the

value of their own contributions.

These difficulties were attributed to initial inadequacies of the students' background in the "building blocks" of transportation engineering. It was, therefore, decided that the start of subsequent projects would be delayed to the Spring semester, to make it possible for the guidance staff to provide entering students, in the Fall semester, with some background in either transportation planning or transportation technology (or both).

Accordingly, the groundwork for the next project (Project D -- Transportation in the Baltimore Region) was started in the Fall semester of 1973, and the workshop activity on this project was carried out from January through December 1974. The guidance staff comprised: Dr. Duncan MacKinnon, Chief of the Advanced Development Branch of the Urban Mass Transportation Administration; Dr. Barry Hyman, GWU associate professor of Applied Science (on leave), A.S.M.E. Congressional Fellow, Staff Engineer for the U.S. Senate; Mr. Eldon Ziegler, Chief of the Demand Responsive Systems Branch of the Urban Mass Transportation Administration; Messrs. Ronald Fisher and Joel Ettinger of the Urban Mass Transportation Administration; Mr. Ned Einstein, a graduate student in Urban and Regional Planning at GWU (the teaching assistant), and this writer.

In addition to the class discussions, some sessions in this project were devoted in part to lectures by members of the staff, and three important presentations were also made by outside lecturers (Mr. Warren Anderson, Director of Planning, Baltimore City Planning Council, who spoke extensively about Baltimore - its problems and its future; Mr. George Granger, of the Office

of the Secretary, Department of Transportation, who discussed the Bart impact analysis, and Mr. Ian Kingham, of the Highway Research Board, whose presentation dealt with innovative short-range solutions to nonrail mass transit problems).

Student papers on this project are collected in Ref.4. It should be noted that, beginning with this project, every student paper had to be evaluated by at least three members of the staff.

Finally, the project just terminated (Project E, dealing with airport access in the Washington Metropolitan Area) was started on January 15, 1975. NSF funding for this project was supplemented, during its second semester, by direct support from the George Washington University's Department of Civil, Mechanical, and Environmental Engineering, and by a grant from the University's Division of Experimental Programs. The guidance staff in this project comprised: Mr. Robert F. Baker, transportation consultant, former Director of the Office of Research and Development of the Federal Highway Administration's Bureau of Public Roads; Mr. Philip H. Clark, of the Council of Governments of Metropolitan Washington; Mr. Joel Ettinger, Administrator of the Transit Planning Assistance Program, Urban Mass Transportation Administration; Dr. Russell M. Lewis, Senior Associate and Director of Engineering (Washington Operations), Wilbur Smith and Associates; Mr. Ernest Weiss, Transportation Systems Specialist, former Executive Director of the National Transportation Safety Board; Mr. Ned Einstein, since last Fall an Urban Planner with Linton and Co. (again the assistant), and this writer. Important presentations were made by members of the guidance staff (Messrs. Joel Ettinger and Philip Clark) and by outside lecturers (Mr. George V. Wickstrom, Director of Technical Services, Council of Governments of Metropolitan

Washington, and Prof. Dorn C. McGrath, Chairman of the GWU Department of Urban and Regional Planning). Guest "discussers" included Messrs. Walt Valona and George Wiggers of the Office of the Secretary, U.S. Department of Transportation.

Student papers on this project are presently being edited. The volume of collected papers (Ref. 5) will be given the usual wide distribution as soon as it is issued.

Complete lists of participating students, staff, and speakers, and of the selected topics in each project are presented in the Appendix.

EXTENT TO WHICH OBJECTIVES HAVE BEEN ACHIEVED

The modifications that have so far evolved through experimentation with the workshop, and the services that have been developed under this grant -- in particular, the expansion of the guidance staff, of library services, and of the assistant's functions-- have now eliminated most of the early difficulties discussed in the preceeding section. Not only is it now possible for students to start work on each project with a reasonable amount of knowledge of some aspects of the transportation field, but their learning experience in the course is also made richer and more exciting by their collaboration with an eclectic and highly professional guidance staff.

There remain, however, some problems which are probably inherent in multidisciplinary group efforts, and for which it is doubtful that any solution exists, other than vigilance on the part of the guidance staff.

One of these is the persistent disinclination of students-- and most notably of students in the "hard engineering" areas-- to keep their individual researches within their respective

fields of competence. This phenomenon had originally been attributed to the students' initial lack of familiarity with the problems of transportation and to their consequent susceptibility to the lure of new vistas in the transportation field. The fact that the difficulty has persisted even with the revised scheduling, which requires the students to acquire a transportation background before starting on the joint project, indicates that the original diagnosis was incorrect. It appears now that the drift away from engineering is nothing but an escape from the rigor and demands of that field, and that, more generally, the trouble may be due to a reluctance of the student to select a field of study to which he or she could be held responsible for serious work on a professional level. It is clear that the situation calls for appropriate constraints on the selection of research topics and for constant watchfulness against stray efforts.

Another problem is that of reconciling the conflicting requirements that the presentations be scholarly and that they be understandable to a multidisciplinary audience; or, to put it another way, the difficulty of keeping individual presentations from becoming either esoteric or frivolous.

A third difficulty stems from the readiness of the group to accept almost any item of hearsay information if no one in the group is competent enough to refute it or to challenge its validity. It may be argued that this vulnerability to misguidance is commonly encountered in the real world of planning and decision making and that, therefore, its apparent inevitability in the course is not entirely void of educational value; but this is small comfort. An attempt has been made to remedy the situation

by requiring that all information obtained from external sources be scrupulously referenced, but this rule is neither effective nor fully enforceable in oral discussions.

Despite these residual difficulties, the objectives of NSF Grant HES-72-07726 A01 can be said to have been achieved to a most gratifying extent. Among the improvements made possible by this grant, the following deserve special mention:

(a) Staff Expansion: A staff of as many as seven or eight members, whose expertise covered much of the transportation field, has been available (and usually present) in some of the most recent projects.

(b) Library: A transportation library has been set up, classified, and codified, for use as background material for research and as reference in class discussions.

(c) Assistance and Liaison: The Assistant's services have been perfected and expanded to include the roles of librarian, student-staff liaison, and editor.*

(d) Course Structure: Thanks to the revised structure and schedule of the workshop, students now enter ES 251 -- a sophisticated, disciplined, and demanding effort -- with a reasonable amount of in-depth knowledge of some aspects of the transportation field.

* Credit for the implementation of these improvements goes primarily to Mr. Ned Einstein, who for the last two and a half years has served the workshop in all these capacities, while also participating in each project as a member of the guidance staff.

EXPERIENCE GAINED, AND RECOMMENDATIONS

On the basis of the experience gained in this program, the following guidelines may be suggested for the organization and management of a graduate-level interdisciplinary workshop in Transportation Engineering:

(1) The workshop should be open only to students who already possess some professional experience or some academic background in either transportation technology or transportation planning.

(2) Every effort should be made to achieve reasonable balance between engineering and nonengineering backgrounds in the working team.

(3) Responsibility for the operation of the workshop must rest on a single faculty member, but guidance in each project must be provided by a multidisciplinary panel. It is not necessary that all members of the guidance staff be present at every meeting of the workshop, but under no condition should guidance be provided by one person alone.

(4) It is highly desirable that each member of the guidance staff prepare, in advance of each project, a list of suggested topics for individual student research and a list of reading material or other sources of information for each topic.

(5) Whenever possible, government officials of the region under study should be invited to present background information, as well as their own personal views, on the region's transportation problems, at an early session of the workshop.

(6) Workshop students should be encouraged to seek and maintain direct contact with government officials of the region they are studying.

(7) All participants must be made to keep their individual researches within their own respective fields of greatest competence and/or experience.

(8) Every term paper should be read and evaluated by more than one member of the guidance staff.

(9) Constant vigilance is required on the part of the guidance staff in each project to keep individual presentations from becoming either esoteric or frivolous, to make sure of the validity of all information introduced in the study, and, in general, to protect the credibility of the project.

REFERENCES

1. "Project A: Transportation in Arlington County, Va.", The George Washington University, School of Engineering and Applied Science (GWU/SEAS), Spring 1971.

2. "Project B: Dulles Airport Rapid Transit Study", GWU/SEAS, 1973, NTIS Accession No. PB-220-074.

3. "Project C: Studies Relating to Transportation in Washington, D.C.", GWU/SEAS, 1973, NTIS Accession No. PB-220-074.

4. "Project D: Topics on Transportation in the Baltimore Region", GWU/SEAS, 1974, NTIS Accession No. PB-224-341/AS

5. "Project E: Airport Access in the Washington Metropolitan Area, GWU/SEAS (to be issued in the Spring of 1976).

APPENDIX

PROJECT A

Transportation in Arlington County, Va.

Guidance Staff

Joseph V. Foa	Professor of Engineering and Applied Science, the George Washington University

Guest Speakers and Advisors

C.G. Stoneburner	Director, Arlington Co. D.O.T.
R.O. Arnold	Arlington Co. D.O.T.
H.S. Hulme	Arlington Co. D.O.T.
E.F. Hunsberger	Arlington Co. D.O.T.
W.C. Scruggs	Arlington Co. D.O.T.
Mr. & Mrs. James L. Govan	Co-chairpersons, Arlington Coalition for Transportation
Barry I. Hyman	Assoc. Professor of Engineering, The George Washington University
Thomas McGean	MITRE Corporation

Students and Student Papers

Aguirre, Gerardo A.	The Price of Clean Air
Bajnaj, Charles S.	Safety--The Incapacitated Operator
Burklew, Donald R. (with Maltese,J.G.)	1. Availability of and Demand for Transportation Services 2. Environmental Impact Analysis of Transportation Systems--With Applications to the Three Sisters Bridge

Chandler, Charles E.	Aesthetic Constraints of Urban Transportation Systems
Crawley, James E.	Social Constraints Imposed on Transportation Systems
Gehr, David R.	1. Forecasts of Travel Patterns 2. A Computerized Traffic Control System for Arlington County
Geiger, Richard B.	1. Desirable Community Roles in the Identification and Formulation of Arlington County's Transportation Needs 2. Forecast of Travel Patterns
Giles, Terry L.	The Soils of Arlington County and their Influence on Transportation and Development Planning
Gilson, John A.	Linear Induction Motors in High Speed Ground Transportation Vehicles
Glendening, Alan S.	New Transportation Systems
Guey, William	1. Patterning of Cities 2. A Dial-A-Ride Transportation Service for Arlington County
Halushynsky, George D.	Evaluation of Transportation Plans: A Survey of Methodologies
Honey, William F.	1. The Community as an Economic Constraint 2. Arlington County's Sensitivity to Forecasting Model Parameters
Iudicello, Alphonse	Increase in Traffic Volumes Through Improvements Utilizing In-Place Road Capacity--Key Bridge and Service Arteries

Klein, Joseph P., III	Interaction of Land Use, Transportation and Utility Services
Lamb, Charles E.	Aesthetic Constraints of Urban Transportation Systems
Lebowitz, Robert K.	Transportation Noise and its Effect on Passenger Comfort and Safety
Lieu, Bing H.	The Polluting Automobile
Lutkefedder, Norman W.	The First Step Toward Improved Integration of Metropolitan Transportation Modes
Maltese, Jasper G.	see Burklew, D.R.
Marino, Vincent A.	The Evaluation of Alternative Transportation Systems
Mogavero, Louis	Long-Range Objectives
Robinson, Edward	Bus Rapid Transit--An Alternative to more Freeway Construction
Robinson, Grace L.	Development of a Fluidic Anti-Lock Control for Air-Brake Systems of Articulated Vehicles
Roshan, Saeed	Parking Facilities
Rutland, Kenneth W.	New Communities--Old Corridors
Sobel, David R.	Comfort and Physiology of Motion
Soulé, Stephen B.	The Interaction of Adjacent Transportation Networks in Metropolitan Areas
Studholme, Edward	Evaluation of Operational Impacts of Planned Transportation Facilities in Arlington County.

Vadeboncoeur, J.R.	Alternative Circulation Systems for Arlington County
Whitehead, Robert W.	Current Tends and Problems in Urban Growth
Wu, Arthur H.	Traffic Control in Arlington County, Va.

PROJECT B

Dulles Airport Rapid Transit (Dart) Study

Guidance Staff

Joseph V. Foa	Professor of Engineering and Applied Science, the George Washington University

Guest Speakers and Advisors

Mark Akins	Senior Transportation Planner, Washington Metropolitan Area Transit Authority (WMATA)
H.S. Hulme, Jr.	Chief, Operations Division, Arlington Co. D.O.T.
W. Earl Long	Urban Planner, WMATA
Charles W. Lustig	Program Development Officer, Northern Virginia Transportation Commission
Albert J. Roohr	Senior Urban Planner, WMATA
James Wielding	Chief Design Engineer, National Capital Airports, Federal Aviation Administration

Students and Student Papers

Andrew, John	1. A Study of a Multi-Level Parking Facility for Dulles International Airport 2. People Movers as an Airport Transportation System
Claveloux, B.A.	1. Assessment of Future Ground Transportation Facilities in the Dulles Airport Area

	2. Route Selection and Alignment Study: Washington to Dulles Airport Rapid Transit Line
Darden, Louis N.	Accessability and Flow Capacity for Skywalks, Subwalks, and Sidewalks
Diaz, Albert A.	Interfacing at Dulles Access Stations
Gustafson, G.G.	1. Control and Communication for a Fully Automated Transportation System
	2. On Fitting a High Speed Rail Line within an Existing Right-of-Way
King, General W.	Expected Effect of Metro Extension on other Modes of Dulles Access
Law, David H.	The Design of the Guideway
Lewis, Daniel	The Linear Induction Motor
Lutkefedder, Norman W.	Dulles Airport Rapid Transit System: A Discussion of Community and Other Cooperative Aspects
Moretz, James S.	Automatic Control of Dart Trains
Teel, Stephen S.	The Feasibility of a Pendulous Roll System for a High Speed Tube Train
Zubkoff, Maurice J.	Air Freight Movement through Terminal Areas and High Speed Ground Transportation

PROJECT C

Transportation in Washington, D.C.

Guidance Staff

Joseph V. Foa	Professor of Engineering and Applied Science, GWU
Carl M. Harris	Professor of Operations Research, GWU
Edward D. Studholme (assistant)	Graduate Student in Urban and Regional Planning, GWU
Ned B. Einstein (assistant)	Graduate Student in Urban and Regional Planning, GWU

Guest Speakers and Advisors

Duncan MacKinnon	Chief, Technology Development, UMTA, USDOT
Thomas McGean	MITRE Corp., Advisor to USDOT
George Oberlander	Director of Long-Range Planning and Regional Affairs, National Capital Planning Commission
F. Houston Wynn	Principal Associate, Wilbur Smith and Associates

Students and Student Papers

Aronstein, R.H.	A Practical Approach to the Evaluation of Alternatives in a Transportation System
Clough, D.R.	Transportation Improvement through Traffic Control

D'Arconte, R.M.	1. Critical Review of Existing Transportation Concepts 2. Split Propulsion for METRO
Darden, L.N.	Accessibility and Capacity of Pedestrian Walks
Farhadi, M.A.	Use of Probability Models in Traffic Predictions
Gale, J.E.	1. Socio-economic Sensitivity Analysis of Transportation Policy Alternatives: A Case Study for Washington, D.C. 2. Considerations on the feasibility of Dial-A-Ride for the Washington, D.C. L'Enfant Area
George, O.R.	Traffic Problems at Major Intersections in Washington, D.C.
Goering, K.L.	1. The Role of Transportation in Urban Development Models 2. Energy Conservation in Urban Transportation
Hanks, R. C.	METRO Parcel Handling System
Hudak, S.	Bicycle Paths for Washington Area Colleges
Keifer, S.C.	Site Selection for the Washington Terminus of the Dulles Airport Rapid Transit
Khoja, M.A.	Transportation Noise Control in Washington, D.C.

PAGE A-10 MISSING FROM DOCUMENT PRIOR TO ITS
BEING SHIPPED TO EDRS FOR FILMING.

Flanagan, S. E.	Help for the Suburbs: Some Alternatives for Suburban Public Transportation
Ikudayisi, J.O.	The Energy Crisis as it Affects Transportation Systems
Kasmierczak, A.	Rail Rapid Transit Safety
Kingham, I.M.	A Passenger Demand Forecasting Methodology for Low Frequency Commuter-Rail Service
Manickam, S.	Elevated Guideway Study on some Aspects for Personal Rapid Transit System
McCready, R.	Urban Transportation Planning: An Intergovernmental Perspective
Mingo, R.	Home-to-Work Travel Associated with Alternative Office Locations
Moody, H.	Mass Transit Accessibility
Pripusich, J.	Dial-A-Ride Feasibility for Suburban Baltimore
Ryan, D.C., Jr.	1. On Evaluating Flow Management Policies as a means of Improving Use of Existing Bus Transit and Automobile Passenger Transportation in Major Urban Areas 2. On Light Rail Rapid Transit- A Perspective
Singpurwala, E.	Urban Transportation Technologies Applicable to Baltimore
Walley, J.	Transportation as a Tool of Community Revitalization
Warman, L.	Bikeway Planning for the Central City

PROJECT E

Airport Access in the Washington Metropolitan Area

Guidance Staff

Joseph V. Foa	Professor of Engineering and Applied Science, GWU
Robert F. Baker	Transportation Consultant
Russell Lewis	Senior Associate and Director of Engineering (Washington Operations), Wilbur Smith & Associates
Joel Ettinger	Administrator of Transit Planning Assistance Program, UMTA, USDOT
Philip H. Clark	Air Facilities Project Manager, Metropolitan Washington Council of Transportation Systems Specialist
Ernest Weiss	Transportation Systems Specialist
Ned Einstein	Urban Planner, Linton & Company

Guest Speakers and Advisors

George Wickstrom	Director of Technical Services, Metropolitan Washington Council of Governments
Dorn McGrath	Professor and Chairman, GWU Department of Urban and Regional Planning
Walt Valona	Transportation Planner, Office of the Secretary, USDOT
George Wiggers	Operations Research Analyst, Office of the Secretary, USDOT

Students and Student Papers

Cooper, Thomas	1. Applications of High Speed Rail Technology to Airport Access in the Washington, D.C. Metropolitan Area 2. Metro Rail/Air Transport Intermodal Pedestrian Access Improvement--Washington National Airport, Washington, D.C.
Cuming, David	1. Transit Service on the Dulles Access Road as an Improvement to Dulles Airport Access 2. Metro Rail/Air Transport Intermodal Pedestrain Access Improvement (with Cooper, Siftar)
Greason, Patricia	What are the Advantages and Disadvantages of Closing National Airport?
Lynch, Robert J.	Defining the Airport Access Problem in the Washington, D.C. Metropolitan Area
McNamara, Thomas	1. Access to Ex-Urban Airports: The Pre-Terminal Concept 2. Transportation Project Selection in the Airport Access Situation
McQueen, Edward	A Complete Pre-Terminal for Dulles International Airport
Ricks, Stephen	Reducing Fuel Consumption in Airport Access
Siftar, Robert	Metro Rail/Air Transport Intermodal Pedestrian Access Improvements (with Cooper, Cuming)
Stangas, Paul	A Discussion of some Effects of the Washington National Airport Metro Rail System

Vakili, Monteza	On the Adequacy of the Dulles Access Road
Van Skoyk, Stephen	A Possible Transportation Network Design for Airport Accessibility in the Washington Metropolitan Area
Wong, William	Demand Forecast of Dulles Airport Travel

THE GEORGE WASHINGTON UNIVERSITY
BENEATH THIS PLAQUE
IS BURIED
A VAULT FOR THE FUTURE
IN THE YEAR 2036
THE PURPOSE OF THIS VAULT IS INSPIRED BY AND IS DEDICATED TO
CHARLES HOOK TOMPKINS
BY THE GEORGE WASHINGTON UNIVERSITY

To cope with the expanding technology, our society must be assured of a continuing supply of rigorously trained and educated engineers. The School of Engineering and Applied Science is completely committed to this objective.